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P. 13

APPENDIX A

SEP 14 2006

[Home](#) | [Author Information](#) | [Registration](#) | [Nanotech Job Fair](#) | [Press Room](#) | [Venue](#) | [Subscribe](#) | [Site Map](#)

> [Program](#)

> [Nano Impact
Workshop](#)

> [Expo](#)

> [How to
Participate](#)

[Program
Sessions](#)

[Sunday](#)

[Monday](#)

[Tuesday](#)

[Wednesday](#)

[Thursday](#)

[Index of Authors](#)

[Index of Keywords](#)

[Confirmed Speakers](#)

[Conferences &
Symposia](#)

Tumor Paint: A chlorotoxin-based biomarker for intra-operative imaging of cancer foci

M. Veiseh, S.B. Bahrami, P. Gabikian, R.G. Ellenbogen and J.M. Olson
Fred Hutchinson Cancer Research Center, US

Keywords:

cancer diagnosis, cancer targeting, chlorotoxin, near infrared imaging

Abstract:

Recent advances in molecular biology and nano-medicine have improved early tumor detection through recognition of molecules that are specifically expressed in malignant cells. This has the potential to specifically "paint" tumors with targeted molecular probes. In this view, we developed and characterized a near infrared (NIR) chlorotoxin-based probe to detect and paint cancer cells in vitro, in vivo and ex vivo. We demonstrate the exquisite delineation of malignant brain cells (glioma and medulloblastoma) from normal brain tissue after systemic administration of the probe in 2 mouse models. The medulloblastoma tumors were formed in the absence of surgical disruption of the blood brain barrier and their NIR signal were detected through intact skull and scalp. The broader utility of the probe was demonstrated through ex vivo and in vivo imaging of adenocarcinoma, rhabdomyosarcoma and spontaneous prostate cancer mice models. Results showed that it could specifically demarcate primary tumors and cognate lung and lymphatic metastases as small as 1.5 mm in diameter. Biodistribution and toxicity studies indicated favorable properties for advancement to human trials. This probe has potential to improve not only intraoperative tumor detection and resection but also diagnosis and imaging of various malignancies.

[Back to Program](#)

[Sessions](#)

[Sunday](#)

[Tuesday](#)

[Wednesday](#)

[Thursday](#)

[Authors](#)

Nanotech 2006 Conference Program Abstract

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PAGE 1/3 * RCVD AT 9/14/2006 11:16:31 AM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/4 * DNIS:2738300 * CSID:617 248 4000 * DURATION (mm:ss):01:42

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Hynes Convention Center, Boston, Massachusetts, May 7-11, 2006

> Program

> Technical Conferences

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> Nanotech Job Fair

> Expo

2006 NSTI Nanotechnology Conference and Trade Show • Nanotech 2006 - 9th Annual

Program Sessions

Sunday

Monday

Tuesday

Wednesday

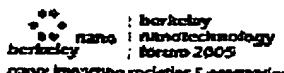
Thursday

Index of Authors

Index of Keywords

Confirmed Speakers

Conferences & Symposia

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Sessions Sunday Monday Tuesday Wednesday Thursday Authors Keywo

8:30 **Keynote - Sensors & Systems: MEMS & NEMS, MSM**
Session chair: Elena Gaura, Coventry University, UK8:30 **Nano Electromechanical Devices: Opportunities and Challenges (invited)**
R.T. Howe, Stanford University, US ([speaker biography](#))9:15 **A Designer's Guide to CMOS MEMS (invited)**
G.K. Fedder, S. Simone and N. Sarkar, Carnegie Mellon University, US ([speaker biography](#))8:30 **Keynote - Soft Nanotechnology: Characterization**
Session chair: Fiona Case, Case Scientific, US8:30 **Colloidal Delivery Systems for Functional Food Design (invited)**
K. Velikov, Unilever R&D, UK ([speaker biography](#))9:15 **Characterization of Nanostructured Materials (invited)**
S.K. Sinha, University of San Diego, US ([speaker biography](#))8:30 **Keynote - Nanotechnology for Cancer Prevention, Diagnosis and Treatment**
Session chair: Mansoor Amiji, Northeastern University8:30 **Challenges in Cancer Prevention, Diagnosis, and Therapy (invited)**
J. Folkman, Children's Hospital Boston, US ([speaker biography](#))9:15 **Delivery of Nano-medicine to Solid Tumors: Role of Tumor Physiology (invited)**
R.K. Jain, MGH, Harvard Medical School, US ([speaker biography](#))8:30 **WCM 1 - Bulk MOS intrinsic models**
Session chair: Xing Zhou, Nanyang Technological University, Singapore8:30 **Carrier Generation and Recombination Currents At Interface Traps in Surface-Potential-Based MOS Transistor Compact Models (invited)**
C-T Sah and B.B. Jie, University of Florida, US9:00 **Symbolic charge-based MOSFET model (invited)**
C. Galup-Montoro and M.C. Schneider, Federal University of Santa Catarina, BR9:30 **Theory and Modeling Techniques used in PSP Model (invited)**
G. Gildenblat, X. Li, H. Wang, W. Wu, A. Jha, R. van Langevelde, A.J. Scholten, G.D.J. Smit and D.B. Klaassen, Pennsylvania State University, US8:30 **Clean and Controlled Environments - A4**
Session chair: Paul Nesdore, Controlled Environments, US8:30 **Why Choose a Design/Build Contractor?**
D. Kirkpatrick, Western Environmental, US9:15 **The Green Clean Laboratory**
R.K. Schneider, Clemson University, US8:30 **Clean and Controlled Environments - B4**
Session chair: Patrice Galvin, Controlled Environments, US8:30 **Critical Cleaning Using CO₂ Snow**
R. Sherman, Applied Surface Technologies, US9:15 **Chemical Filtration Strategies for the Control of Airborne Molecular Contamination**
B. Stanley, Purafil, US8:30 **TechConnect Corporate Models and Needs**